Claims

What is claimed is:

1.   A system for exchanging information in a multi-protocol work machine environment having a network of modules, the system comprising:

a first module for sending a message, the first module coupled to a first data link that uses a first protocol;

a second module for receiving the message over a second data link, the second data link using a second protocol; and

a gateway interconnecting the first and second data links and configured to:

receive the message from the first data link in the first protocol,

determine whether the message is to be transmitted on the second data link based on an identifier included in the message,

encapsulate the message within a transmission unit consistent with the second protocol, and

transmit the encapsulated message to the second module over the second data link using the second protocol,

wherein the second module is configured to receive the encapsulated message and extract the message from second protocol transmission unit.

2.   The system of claim 1, wherein the first data link is a proprietary data link.

3.   The system of claim 1, wherein the second data link is a non-proprietary standard data link including one of J1939, CAN, MODBUS, serial standard data link, and the Ethernet.

4.   The system of claim 1, wherein the gateway is further configured to discover, upon receiving the message from the first data link, that the first protocol is incompatible with the second protocol.

5.   The system of claim 1, wherein the gateway is pre-configured to encapsulate messages received from the first data link within transmission units consistent with the second protocol.

6.   A system for exchanging information in a multi-protocol work machine environment having a network of modules, the system comprising:

a plurality of source data links, each using one of a plurality of source protocols;

at least one destination module for receiving messages over a destination data link, the destination data link using a destination protocol that is different from the source protocols; and

a gateway interconnecting the source and destination data links and configured to:

receive messages from the source data links in the source protocols,

determine whether the messages are to be transmitted on the destination data link based on identifiers included in the messages,

encapsulate the messages within transmission units consistent with the destination protocol, and

transmit the encapsulated messages to the destination module over the destination data link using the destination protocol.

7.   The system of claim 6, wherein the destination module is configured to receive the encapsulated messages and extract the messages from destination protocol transmission units.

8. The system of claim 6, wherein the gateway receives and encapsulates the messages simultaneously.

9. A system for exchanging information in a multi protocol work machine environment having a network of modules, the system comprising:

a source module for sending messages, the source module coupled to a source data link that uses a first protocol;

a plurality of destination data links, each destination data links using one of plurality of destination protocols, wherein the source and destination protocols are inconsistent; and

a gateway interconnecting the source and destination data links and configured to:

receive the messages from the source data link in the source protocol,

determine over which of the plurality of destination data links each message is to be transmitted based on identifiers included in the messages,

encapsulate each message within a transmission unit consistent with the respective destination protocol used by the determined destination data link, and

transmit the encapsulated messages over the destination data links using the respective destination protocols.

10. The system of claim 9, wherein a plurality of destination modules are configured to receive the encapsulated messages and extract the messages from the respective destination protocol transmission units.

11. The system of claim 9, wherein the gateway encapsulates and transmits the messages simultaneously.

12. The system of claim 9, wherein the source data link is a proprietary data link.

13. The system of claim 9, wherein the destination data links are non-proprietary standard data links.

14. A system for exchanging information in a multi-protocol work machine environment having an on-board network of modules, the system comprising:

a first on-board module for sending a message, the first module coupled to a first data link that uses a first protocol;

a second on-board module for receiving the message over a second data link, the second data link using a second protocol; and

a gateway interconnecting the first and second data links and configured to:

receive the message from the first data link in the first protocol,

determine whether the message is to be transmitted on the second data link based on an identifier included in the message,

encapsulate the message within a transmission unit consistent with the second protocol, and

transmit the encapsulated message to the second module over the second data link using the second protocol,

wherein the second module is configured to receive the encapsulated message and extract the message from second protocol transmission unit.

15. The system of claim 14, wherein the first data link is a proprietary data link.

16.   The system of claim 14, wherein the second data link is a non-proprietary standard data link including one of J1939, CAN, MODBUS, serial standard data link, and the Ethernet.

17.   The system of claim 14, wherein the gateway is further configured to discover, upon receiving the message from the first data link, that the first protocol is incompatible with the second protocol.

18.   The system of claim 14, wherein the gateway is pre-configured to encapsulate messages received from the first data link within transmission units consistent with the second protocol.

19.   A system for exchanging and managing information in a multi-protocol work machine environment including a network of modules, the system comprising:

a source module for sending a source message, the source module coupled to a source data link that uses a first protocol;

a destination module for receiving the source message;

a first gateway coupled to the source data link and an intermediate data link, the intermediate data link using a second protocol, the first gateway configured to:

receive the message from the source data link in the first protocol,

encapsulate the message within a transmission unit consistent with the second protocol, and

output the encapsulated message to the intermediate data link using the second protocol; and

a second gateway coupled to the intermediate data link and the destination module, the second gateway configured to:

receive the encapsulated message from the intermediate data link;

extract the source message from the second protocol transmission unit; and

route the source message to the destination module.

20.   The system of claim 19 further comprising:

a destination data link coupled to the second gateway and the destination module for transporting messages from the second gateway to the destination module.

21. The system of claim 20, wherein the destination data link uses the source protocol.

22. The system of claim 19, wherein the first gateway is configured to determine, upon receiving the source message, that the source message is to be encapsulated within the second protocol transmission unit.

23. The system of claim 22, wherein the first gateway determines to encapsulate the source message by way of examining a destination identifier included in the source message.

24. The system of claim 19, wherein the source data link is a proprietary data link.

25. The system of claim 19, wherein the intermediate data link is a non-proprietary standard data link including one of a J1939, CAN, MODBUS, serial standard data link, and the Ethernet.

26. The system of claim 19, wherein the source module is an on-board module located within a first work machine.

27. The system of claim 26, wherein the destination module is an on-board module located within the first work machine.

28. The system of claim 26, wherein the destination module is an off-board module located external to the first work machine.

29. The system of claim 28, wherein the second gateway is located external to the first work machine.

30.   The system of claim 19, wherein the source module is an off-board module.

31.   The system of claim 19, wherein the destination module is an off-board module.

32.   The system of claim 26, wherein the second gateway is located within the first work machine.

33.   A method for exchanging information in a multi-protocol work machine environment, the method comprising:

outputting a message, by a source module, on a first data link that uses a first protocol;

receiving, by a gateway, the message from the first data link in the first protocol;

encapsulating, by the gateway, the received message within a transmission unit consistent with a second protocol, and

outputting the encapsulated message on a second data link using the second protocol;

receiving, by a destination module, the encapsulated message from the second data link; and

extracting, by the destination module, the message from the second protocol transmission unit.

34. A method for exchanging information in a multi-protocol work machine environment, the method comprising:

outputting a message, by a source module, on a first data link that uses a first protocol;

receiving, by a gateway, the message from the first data link in the first protocol;

encapsulating, by the gateway, the received message within a transmission unit consistent with a second protocol, and

outputting the encapsulated message on a second data link using the second protocol;

receiving, by a second gateway, the encapsulated message from the second data link;

extracting, by the second gateway, the message from the second protocol transmission unit; and

routing, by the second gateway, the extracted message to a destination module.

35. A method for translating messages in a multi-protocol work machine environment, the method comprising:

receiving, by a gateway, a message in a first data link protocol, the message including parameter data formatted in the first protocol and a corresponding parameter identifier;

extracting the parameter identifier and storing the parameter data, by the gateway;

scaling the parameter data according to a scale factor associated with a second data link protocol; and

transmitting the scaled parameter data via the second data link protocol to a destination module.

36.   A method for translating messages in a multi-protocol work machine environment, the method comprising:

receiving, by a gateway, a message in a first data link protocol used by a work machine, the message including a parameter identifier;

matching, by the gateway, the parameter identifier with a corresponding parameter identifier included in a translation table associated with the gateway,

scaling parameter data associated with the parameter identifier using a scale factor corresponding to a second data link protocol, and

sending a message including the scaled parameter data to a module using the second data link protocol.

37.   The method of claim 36, wherein the first data link protocol is a proprietary data link protocol.

38.   The method of claim 36, wherein the second data link protocol is a non-proprietary protocol including one of a J1939 protocol, a CAN protocol, a MODBUS protocol, a serial standard data link protocol, and an Ethernet protocol.

39.   A system for exchanging information in a multi-protocol work machine environment, the system comprising:

a translation table implemented in a memory device, the translation table including:

at least one parameter identifier,

a plurality of scale factors associated with the at least one parameter identifier, wherein each of the plurality of scale factors corresponds to a different data link protocol, and

a universal storage section for storing parameter data associated with the parameter identifier; and

a gateway residing in a work machine configured to access the translation table, wherein the gateway device:

receives a message, including a first parameter identifier and first parameter data, from a first data link used by the work machine,

determines whether the first parameter matches the parameter in the translation table,

when a match is found by the gateway, scaling the first parameter data using one of the plurality of scale factors that corresponds to a second data link protocol, and

outputting the scaled parameter data to a second data link using the second data link protocol.

40.   The system of claim 39, wherein the first data link protocol is a proprietary data link protocol.

41.   The system of claim 39, wherein the first data link protocol is a non-proprietary protocol including one of a J1939 protocol, a CAN protocol, a MODBUS protocol, a serial standard data link protocol, and an Ethernet protocol.

42. The system of claim 39, wherein the second data link protocol is a non-proprietary protocol including one of a J1939 protocol, a CAN protocol, a MODBUS protocol, a serial standard data link protocol, and an Ethernet protocol.

43. A system for exchanging information in a multi-protocol work machine environment including a network of modules, the system comprising:

a source module for sending a source message, the source module coupled to a source data link that uses a first protocol;

a destination module for receiving the source message, the destination module located at a distance from the source module that exceeds a transmission range of the first protocol;

a first gateway coupled to the source data link and an intermediate data link, the intermediate data link using a second protocol, the first gateway configured to:

receive the message from the source data link in the first protocol,

encapsulate the message within a transmission unit consistent with the second protocol, and

output the encapsulated message to the intermediate data link using the second protocol; and

a second gateway coupled to the intermediate data link and the destination module, the second gateway configured to:

receive the encapsulated message from the intermediate data link;

extract the source message from the second protocol transmission unit; and

route the source message to the destination module.

44.   A system for exchanging information in a multi-protocol work machine environment including a network of modules, the system comprising:

a source module for sending a source message, the source module coupled to a source data link that uses a first protocol;

a destination module for receiving the source message, the destination module located at a distance from the source module that exceeds a transmission range of the first protocol;

a first gateway coupled to the source data link and an intermediate data link, the intermediate data link using a second protocol, the first gateway configured to:

receive the message from the source data link in the first protocol,

encapsulate the message within a transmission unit consistent with the second protocol, and

output the encapsulated message to the intermediate data link using the second protocol; and

a second gateway coupled to the intermediate data link and the destination module, the second gateway configured to:

receive the encapsulated message from the intermediate data link;

extract the source message from the second protocol transmission unit;

translate the extracted message into a comparable message of a destination protocol used by a destination data link coupled to the destination module; and

route the translated message to the destination module over the destination data link.

45.   A computer-readable medium including instructions for performing a method in multi-protocol work machine environment, the method performed by a gateway and comprising:

receiving, by the gateway, a message from a first data link in a first protocol;

encapsulating, by the gateway, the received message within a transmission unit consistent with a second protocol, and

outputting the encapsulated message on a second data link using the second protocol for receipt by a module coupled to the second data link.

46.   A computer-readable medium including instructions for performing a method in multi-protocol work machine environment, the method performed by a gateway and comprising:

receiving, by the gateway, a message in a first data link protocol used by a work machine, the message including a parameter identifier;

matching, by the gateway, the parameter identifier with a corresponding parameter identifier included in a translation table associated with the gateway,

scaling parameter data associated with the parameter identifier using a scale factor corresponding to a second data link protocol, and

sending a message including the scaled parameter data to a module using the second data link protocol.